

Technological Innovations in Sensing and Detection of Chemical, Biological, Radiological, Nuclear Threats and Ecological Terrorism

edited by

Ashok Vaseashta

Institute for Advanced Sciences Convergence and Int'l Clean Water Institute
Norwich University Applied Research Institutes
Herndon, VA USA

VTT/AVC U.S. Department of State
Washington DC USA

and

Eric Braman and Philip Susmann

Norwich University Applied Research Institutes
Northfield, VT, USA



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Chapter 26

Exploring the Mechanism of Biomolecule Immobilization on Plasma-Treated Polymer Substrates

Biomolecule Immobilization on Plasma-Treated Polymer

E.H. Lock, S.H. North, J. Wojciechowski, C.R. Taitt, and S.G. Walton

Abstract An electron beam-generated plasma source developed at NRL was used to modify polystyrene microtitre plates. A combination of complementary surface analytical and biochemical techniques was applied to evaluate the relationship between the biotic and abiotic layers, with particular emphasis on the efficiency of the preparation of polymer surfaces and its effectiveness for bioimmobilization. We conclude that the development of novel interface materials with superior transducing capabilities is dependent on the deeper understanding of the complex physico-chemical, nanoscale interactions between the substrate surface and the biological components attached to it.

Keywords Polystyrene • Silanization • Characterization • Functionalization

26.1 Introduction

Microtitre plates are widely used in clinical diagnostics, biotech and pharmaceutical research and development. They are manufactured using a variety of polymeric materials, but polystyrene is most commonly employed because it readily adsorbs proteins, has excellent optical as well as mechanical properties, and is cost-effective.

E.H. Lock (✉) • S.G. Walton
Plasma Physics Division, U.S. Naval Research Laboratory, 4555 Overlook Ave. SW,
Washington, DC, USA
e-mail: evgeniya.lock@nrl.navy.mil

S.H. North • J. Wojciechowski • C.R. Taitt
Center for Bio/Molecular Science & Engineering, U.S. Naval Research Laboratory,
Washington, DC, USA